Landforms and Oceans

5.3 The student will demonstrate an understanding of features, processes, and changes in Earth's land and oceans. (Earth Science)

5-3.1 Explain how natural processes (including weathering, erosion, deposition, landslides, volcanic eruptions, earthquakes, and floods) affect Earth's oceans and land in constructive and destructive ways.
Taxonomy level: 2.7-B Understand Conceptual Knowledge

Previous/Future knowledge: In 3rd grade (3-3.8), students illustrated changes in Earth's surface that are due to slow processes (including weathering, erosion, and deposition) and those changes due to rapid features (landslides, volcanic eruptions, floods and earthquakes). The primary focus was to provide examples of such changes. In 8th grade (8-3.6) the concept of plate tectonics, the movement of Earth's crustal plates, including its relationship to earthquakes and volcanoes, will be further studied.

It is essential for students to know Earth's oceans and land can be affected in constructive ways and destructive ways by natural processes.

Constructive
- Processes that create landforms (deposition, landslides, volcanic eruptions, floods)

Destructive
- Processes that destroy landforms (weathering, erosion, landslides, volcanic eruptions, earthquakes, floods)

Natural processes that can affect Earth's oceans and land include:

Weathering
- Weathering is a general term used to describe processes that break down rocks at or near the surface of the earth.
- Weathering can be either physical or chemical.
- These processes cause the surface of the earth to dissolve, decompose, and break into smaller pieces.
- Water is an important cause of weathering.
- Plants cause weathering when roots break apart rock.
- Changes in temperature can break rock, as well as ice forming inside cracks in the rock causing it to break even more.
- Anything that causes rocks to wear down or break apart is a cause of weathering.

Erosion
- Erosion is the movement of *sediments* and soil by wind, water, ice, and gravity.

Deposition
- Deposition is the dropping, or *depositing*, of sediments by water, wind, or ice.
- Deposition builds up new land on Earth's surface, like a delta at the end of a river or the pile up of a sand dune in the desert.
- Shells on the beach are deposition by ocean waves.

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Landslides

- Landslides are mass movements of land due to gravity.
- Landslides can cause buildings to fall, or power and gas lines to break.
- Landslides even occur on the continental slope in the ocean.

Volcanic eruptions

- Volcanoes are mountains with openings in Earth's crust through which magma, gases, and ash reach Earth's surface.
- Volcanoes can change Earth's surface.
- When the magma erupts from the volcano the top of the mountain can be changed, either built up or exploded off.
- The lava and ash can destroy forests and bury fields.
- Volcanic eruptions can even change Earth's weather patterns.
- Volcanic eruptions also occur under the oceans; these volcanoes that are built up are called *seamounts*.
- If the seamount rises above the ocean surface it is called a *volcanic island* (for example Hawaii or Japan).

Earthquakes

- Earthquakes are vibrations on Earth's surface caused by sudden movement in Earth, often along a *fault*, a break in Earth's surface.
- Some earthquakes cause little damage and some cause a lot of damage.
- Large earthquakes can cause landslides.
- Earthquakes under the ocean can cause huge waves, called *tsunamis* that destroy land and cause great damage if they come ashore.

Floods

- Floods occur when a large amount of water covers land that is usually dry.
- When the flood occurs, rapid erosion can take place and move soil and sediments away.
- When the flood recedes, new sediment is left behind and can build up rich soil deposits.

It is not essential for students to know about the movement of Earth's plates (the theory of plate tectonics), or how volcanoes, mountains, and earthquakes are produced.

Assessment Guidelines:

The objective of this indicator is to *explain* the effects natural processes on the Earth's oceans and land; therefore, the primary focus of assessment should be to construct a cause-and-effect model of the various ways that the ocean and land is affected by the processes of weathering, erosion, deposition, landslides, volcanic eruptions, earthquakes and floods. However, appropriate assessments should also require students to *recall* what each of the processes are; *compare* constructive and destructive processes; *illustrate* with pictures or diagrams the changes that take place with these processes; *classify* the processes as constructive or destructive; or *exemplify* ways that the processes affect the land and oceans.